Document Number 1

Entry 1 of 1 File: USPT May 4, 1999

US-PAT-NO: 5901303
DOCUMENT-IDENTIFIER: US 5901303 A

TITLE: Smart cards, systems using smart cards and methods of operating said cards in systems
DATE-ISSUED: May 4, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chew; Gary	Singapore	N/A	N/A	SGX

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Gemplus Card International	Gemenos	N/A	N/A	FRX	03

APPL-NO: 8/ 773190
DATE FILED: December 27, 1996

INT-CL: [6] G06F 12/14
US-CL-ISSUED: 395/400; 235/492
US-CL-CURRENT: 711/115; 235/492
FIELD-OF-SEARCH: 395/400, 235/492

REF-CITED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
5206938	April 1993	Fujioka	395/400

ART-UNIT: 286
PRIMARY-EXAMINER: Pitts; Harold I.
ATTY-AGENT-FIRM: Plottel; Roland

ABSTRACT:

A smart card has a repository having a first data element and a value added function. The card further has an operating system having a data element access function for sequencing to said repository and a microprocessor for executing said data element and said value added function in accordance with said access function.

13 Claims, 7 Drawing figures

11. Review the medical record to determine if any of the following were experienced by the mother at the time of surgery. Check YES where applicable. Check all that apply.

Injury to pelvic organs
Pelvic hematoma
Maternal distress
Shock during or following delivery
Acute renal failure following delivery

12. Review the medical record to determine if any of the following conditions occurred during hospitalization. Check YES where applicable. Check all that apply.

Post hemorrhage
Complications of the administration of anesthesia
Maternal hypotension syndrome
Major puerperal infection
Pulmonary embolism

13. Review the medical record to determine if any of the following conditions occurred after discharge. Check YES where applicable. Check all that apply.

Delayed and secondary postpartum hemorrhage
Postpartum coagulation defects
Venous complications in pregnancy and the puerperium
Superficial thrombophlebitis
Deep phlebothromboses

13a. If you answered YES to question 13, review the chart to determine if a readmission occurred. If so, check YES and enter the admitting diagnoses on the line provided and the date of service.

If no readmission, check NO.

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Entry 1 of 1 File: USPT May 4, 1999

DOCUMENT-IDENTIFIER: US 5901303 A

TITLE: Smart cards, systems using smart cards and methods of operating said cards in systems

DEPR:

The ~~functions or~~ commands to create ~~active data elements Di and/or~~ tags to designate a data element as active and/or privileged locations in the smart card to store the active data elements would all be protected by ~~access security functions~~.

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Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC

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What is claimed is:

1. In a medical information system comprising a processing unit, at least one memory unit and means for entering information into said medical information system and for providing commands to said medical information system, a method of analyzing health care claims records for an enrolled population to assess quality of care received by enrollees having a specified health care condition and formulate action recommendations to improve care comprising:

(a) providing to said processing unit of said medical information system health care claims records for a selected enrollee population;

(b) defining in the medical information system at least one health care condition in terms of a specified logical relationship among a plurality of health care events relevant to diagnosis and reported in the health care claims records;

(c) identifying in the health care claims records those enrollees meeting the definition for said at least one health care condition;

(d) defining in the medical information system health care quality criteria for said at least one health care condition in terms of a plurality of health care events reported or reportable in the health care claims records, including at least one intervention based on practice guidelines and related to care for the at least one health care condition;

(e) comparing the health care quality criteria for said at least one health care condition to the health care claims records for at least a portion of those enrollees meeting the definition for said at least one health care condition; and

(f) developing and outputting from said medical information system a health care quality report based on the comparison of step (e) and including action recommendations for improving health care quality.

2. The method of claim 1 wherein the step of providing health care claims records comprises providing records from a group consisting of: claims records for medical professional services, claims records for hospital services and claims records for pharmaceutical prescriptions.

3. The method of claim 1 wherein multiple health care conditions and corresponding health care quality criteria for said multiple health care conditions are defined.

4. The method of claim I further comprising the steps of:

(g) providing to said processing unit of said medical information system medical records for a selected enrollee population that is a subset of the enrollee population identified as meeting the definition for said at least one health care condition;

(h) defining health care quality criteria for said at least one health care condition also in terms of health care events reported or reportable in the medical records;

(i) comparing the health care quality criteria for said at least one health care condition to the medical records for at least some of those enrollees meeting the definition for said at least one health care condition; and

(j) developing and outputting from said medical information system a report based on the comparison of step (i) as well as step (e) and including action recommendations for improving health care quality as defined by said health care quality criteria.

5. The method of claim 1 wherein the step of defining at least one health care condition in terms of health care events relevant to diagnosis and reported in the health care claims records comprises defining a specific health care condition in the nature of a disease or organic dysfunction.

6. The method of claim 5 wherein the at least one health care condition is selected from a group consisting of: pediatric asthma, diabetes mellitus, hypertension, and breast cancer.

7. The method of claim 1 wherein the step of defining at least one health care condition in terms of health care events relevant to diagnosis and reported in the health care claims records further comprises defining a specific health care condition not in the nature of a disease or organic dysfunction.

8. The method of claim 7 wherein the at least one health care condition is selected from a group consisting of: prenatal care, caesarian section, breast cancer screening, cervical cancer screening and pediatric immunizations for a specified age group.

9. The method of claim 1 wherein step (f) comprises developing and outputting from said medical information system a health care quality report that reports statistics on at least one adverse event as an indicator of a health care quality problem.

10. The method of claim 1 wherein step (f) comprises developing and outputting from said medical information system a health care quality report that reports a frequency of occurrence of at least one health care quality criterion.

11. In a medical information system comprising a processing unit, at least one memory unit and means for entering information into said medical information system and for providing commands to said medical information system, a method of analyzing health care claims records for an enrolled population to assess quality of care received by enrollees having a specified health care condition and formulate action recommendations to improve care comprising:

(a) providing to said processing unit of said medical information system health care claims records for a selected enrollee population, said claims records comprising claims records for medical professional services, claims records for hospital services and claims records for pharmaceutical prescriptions;

(b) defining in the medical information system at least one health care condition in terms of a specified logical relationship among a plurality of health care events relevant to diagnosis and reported in the health care claims records;

(c) identifying in the health care claims records those enrollees meeting the definition for said at least one health care condition;

(d) defining in the medical information system health care quality criteria for said at least one health care condition in terms of a plurality of health care events reported or reportable in the health care claims records, including at least one intervention based on practice guidelines and related to care for the at least one health care condition;

(e) comparing the health care quality criteria for said at least one health care condition to the health care claims records for at least a portion of those enrollees meeting the definition for said at least one health care condition; and

(f) developing and outputting from said medical information system a health care quality report based on the comparison of step (e) and including action recommendations for improving health care quality as defined by said health care quality criteria.

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Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC

Document Number 1

Entry 1 of 1 File: USPT Feb 24, 1998

103

US-PAT-NO: 5721781
DOCUMENT-IDENTIFIER: US 5721781 A

TITLE: Authentication system and method for smart card transactions
DATE-ISSUED: February 24, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Seidensticker; Robert B.	Woodinville	WA	N/A	N/A
Simon; Daniel R.	Redmond	WA	N/A	N/A

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Microsoft Corporation	Redmond	WA	N/A	N/A	02

APPL-NO: 8/ 531567
DATE FILED: September 13, 1995

INT-CL: [6] H04K 1/00
US-CL-ISSUED: 380/25; 380/23
US-CL-CURRENT: 705/67; 713/169, 713/173
FIELD-OF-SEARCH: 380/23, 380/24, 380/25

REF-CITED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
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5140634	August 1992	Guillou et al.	380/23
5276311	January 1994	Hennige	235/380
5473690	December 1995	Grimonprez et al.	380/24
5544246	August 1996	Mandelbaum et al.	380/24

ART-UNIT: 222
PRIMARY-EXAMINER: Cain; David C.
ATTY-AGENT-FIRM: Lee & Hayes, PLLC

ABSTRACT:

An authentication system includes a portable information device, such as a smart card, that is configured to store and process multiple different applications. The smart card is assigned its own digital certificate which contains a digital signature from a trusted certifying authority and a unique public key. Each of the applications stored on the smart card is also assigned an associated certificate having the digital signature of the certifying authority. The system further includes a terminal that is capable of accessing the smart card. The terminal has at

information from said health care claims records for hospital services; and

information from said health care claims records for pharmaceutical prescriptions.

21. The system of claim **17**, wherein said data medium includes at least one random access memory device.

22. The system of claim **17**, wherein said data medium includes at least one magnetic media disk.

23. A data storage medium for use with a processor that accesses a database of information from health care claim records for an enrolled population, wherein the data storage medium has a program stored on it that causes the processor to:

(a) define at least one health care condition in terms of a specified logical relationship among a plurality of health care events relevant to diagnosis and reported or reportable in said health care claims records;

(b) define health care quality criteria in terms of a plurality of health care events reported or reportable in said health care claims records, including at least one intervention based on practice guidelines and related to care for said at least one health care condition;

(c) identify enrollees meeting said definition for said at least one health care condition;

(d) compare health care quality criteria for said at least one health care condition to said information from said health care claims records for at least a portion of those enrollees meeting said definition for said at least one health care condition; and

(e) formulate action recommendations for improving health care quality as defined by said health care quality criteria.

* * * * *

least one compatible application which operates in conjunction with an application on the smart card. The terminal is assigned its own certificate which also contains the digital signature from the trusted certifying authority and a unique public key. Similarly, the application on the terminal is given an associated digital certificate. During a transactional session, the smart card and terminal exchange their certificates to authenticate one another. Thereafter, a smart card application is selected and the related certificates for both the smart card application and the terminal application are exchanged between the smart card and terminal to authenticate the applications. Additionally, the cardholder enters a unique PIN into the terminal. The PIN is passed to the smart card for use in authenticating the cardholder. The three-tiered authentication system promotes security in smart card transactions.

21 Claims, 9 Drawing figures

12. The method of claim 11 wherein multiple health care conditions and corresponding health care quality criteria for said multiple health care conditions are defined.

13. The method of claim 11 further comprising the steps of:

(g) providing to said processing unit of said medical information system medical records for a selected enrollee population that is a subset of the enrollee population identified as meeting the definition for said at least one health care condition;

(h) defining health care quality criteria for said at least one health care condition also in terms of health care events reported in the medical records;

(i) comparing the health care quality criteria for said at least one health care condition to the medical records for at least some of those enrollees meeting the definition for said at least one health care condition; and

(j) developing and outputting from said medical information system a report based on the comparison of step (i) as well as step (e) and including action recommendations for improving health care quality as defined by said health care quality criteria.

14. A medical information system for analyzing health care claims records for a health care benefit plan to assess quality of care received by plan members having a specified health care condition and formulate action recommendations to improve care comprising:

(a) a central processing unit;

(b) at least one memory unit connected to said central processing unit;

(c) means for providing to said processing unit health care claims records for a selected enrollee population;

(d) means for defining at least one health care condition in terms of a specified logical relationship among a plurality of health care events relevant to diagnosis and reported in the health care claims records;

(e) means for identifying in the health care claims records those enrollees meeting the definition for said at least one health care condition;

(f) means for defining health care quality criteria for said at least one health care condition in terms of a plurality of health care events reported or reportable in health care claims records, including at least one intervention based on practice guidelines related to care for the at least one health care condition;

(g) means for comparing the health care quality criteria for said at least one health care condition to the health care claims records for at least a portion of those enrollees meeting the definition for said at least one health care condition; and

(h) means for developing and outputting from said medical information system a health care quality report based on the comparison performed by means (g) and including action recommendations for improving health care quality as defined by said health care quality criteria.

15. The system of claim 14 wherein the means for providing health care claims records comprises means for providing records from a group consisting of: claims records for medical professional services, claims records for hospital services and claims records for pharmaceutical prescriptions.

16. The system of claim 14 further comprising:

(i) means for providing to said processing unit of said medical information system medical records for a selected enrollee population that is a subset of the enrollee population identified as meeting the definition for said at least one health care condition;

(j) means for defining health care quality criteria for said at least one health care condition also in terms of health care events reported or reportable in the medical records;

(k) means for comparing the health care quality criteria for said at least one health care condition to the medical records for at least some of those enrollees meeting the definition for said at least one health care condition; and

(l) means for developing and outputting from said medical information system a report based on the comparison performed by means (k) as well as means (g) and including action recommendations for improving health care quality as defined by said health care quality criteria.

17. A medical information system for analyzing records for a health care benefit plan, wherein said medical information system assesses quality of care received by plan members having a specified health care condition and formulates action recommendations to improve care, said medical information system comprising:

(a) a processor;

(b) a database, accessible by said processor, wherein said database includes information from health care claim records for a selected enrollee population that is a subset of the enrollee population identified as meeting said definition for said at least one health care condition;

(c) a data storage medium accessible by the processor, wherein the data storage medium has a program stored on it, and wherein the program is configured to cause the processor to:

define at least one health care condition in terms of a specified logical relationship among a plurality of health care events relevant to diagnosis and reported or reportable in said health care claims records,

define health care quality criteria in terms of a plurality of health care events reported or reportable in said health care claims records, including at least one intervention based on practice guidelines and related to care for said at least one health care condition,

identify enrollees meeting said definition for said at least one health care condition,

compare health care quality criteria for said at least one health care condition to said information from said health care claims records for at least a portion of those enrollees meeting said definition for said at least one health care condition, and

formulate action recommendations for improving health care quality as defined by said health care quality criteria; and

(d) an output device, connected to the processor, for outputting from said medical information system a health care quality report.

18. A medical information system as claimed in claim 17, wherein said output device is a printer.

19. A medical information system as claimed in claim 17, wherein said output device is a computer display.

20. A medical information system as claimed in claim 17, wherein said claims database includes

information from said health care claims records for medical professional services;

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Entry 1 of 1 File: USPT Feb 24, 1998

DOCUMENT-IDENTIFIER: US 5721781 A
TITLE: Authentication system and method for smart card transactions

DEPR:
To solve this dilemma, encryption algorithms introduce "digital signatures" which are employed to ensure that the appropriate parties are communicating with each other. Thus, when the smart card encrypts a message using the terminal's public key, it tags____ a personalized digital signature onto the message. The smart card encrypts the combined message using its own private key. The resulting communication is represented as follows:

US005404291A

United States Patent [19]

Kerr et al.

[11] Patent Number: 5,404,291

[45] Date of Patent: Apr. 4, 1995

[54] **INVENTORY CONTROL PROCESS FOR RESERVATION SYSTEMS**

[75] Inventors: **Gordon S. Kerr**, Chicago; **Todd Snyder**, Glendale Heights; **Ken Dowling**, Arlington Heights; **Joyce Willenborg**, Oak Park, all of Ill.

[73] Assignee: **Hyatt Corp.**, Chicago, Ill.

[21] Appl. No.: **689,662**

[22] Filed: **Apr. 23, 1991**

Related U.S. Application Data

[63] Continuation of Ser. No. 439,253, Nov. 20, 1989, abandoned.

[51] **Int. Cl.**[6] **G06F 15/00**

[52] **U.S. Cl.** **364/407**; 364/401; 364/406; 340/825.28; 235/385

[58] **Field of Search** 364/407, 468, 401, 406; 340/825.28; 235/385

[56] **References Cited**

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International application No. PCT/US82/00701, Pitroda; published as WO 83/04327, Dec. 1983.

Primary Examiner—Gail O. Hayes

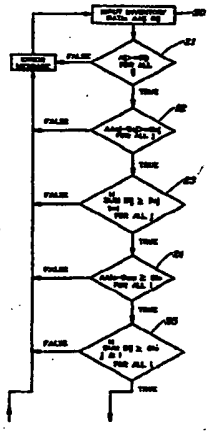
Assistant Examiner—Frantzy Poinvil

Attorney, Agent, or Firm—Milton S. Gerstein; Marvin Benn

[57] **ABSTRACT**

A reservations system for hotel chains in which matrix arrays defining maximum rooms for sale, protected inventory, and matrices derived from these two, all by room-type/rate-category combinations. The system provides for generalized control of inventory for sale for an arbitrary number of room-types, rate-categories, etc. The system also allows blocking or protecting inventory by rate-category, room-type, or any combination. The system of the invention allows for either a central or a distributed view of inventory, and allows inventory to be controlled by the property and sold at any location without over-selling. The system of the invention provides the level of control necessary to handle the four major inventory control strategies that the hotel industry will likely require over the next ten years: total control centrally, central indicators and distributed inventory, totally distributed inventory, or a mixed mode of operation utilizing any combination of central or distributed inventory. In each case, the system of the invention provide a common, effective and complete solution.

14 Claims, 3 Drawing Sheets



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Search Results -

Terms	Documents
19 and verif$	10

Database: US Patents Full-Text Database

Refine Search: 19 and verif$

Search History

DB Name	Query	Hit Count	Set Name
USPT	19 and verif$	10	L10
USPT	18 and authentic$	12	L9
USPT	(smart adj card$) with (tag$1 or label$1)	34	L8
USPT	11 and (smart$ with label$)	0	L7
USPT	11 and (smart$ with tag$)	0	L6
USPT	11 and ((smart card) same tag$)	0	L5
USPT	11 and (smart(w)card same tag$)	3	L4
USPT	11 and (smartcard same tag$)	0	L3
USPT	11 and (smartcard or smart(w)card)	5	L2
USPT	5140634.pn. or 5367148.pn. or 4995082.pn. or 4463250.pn. or 4864110.pn.	5	L1

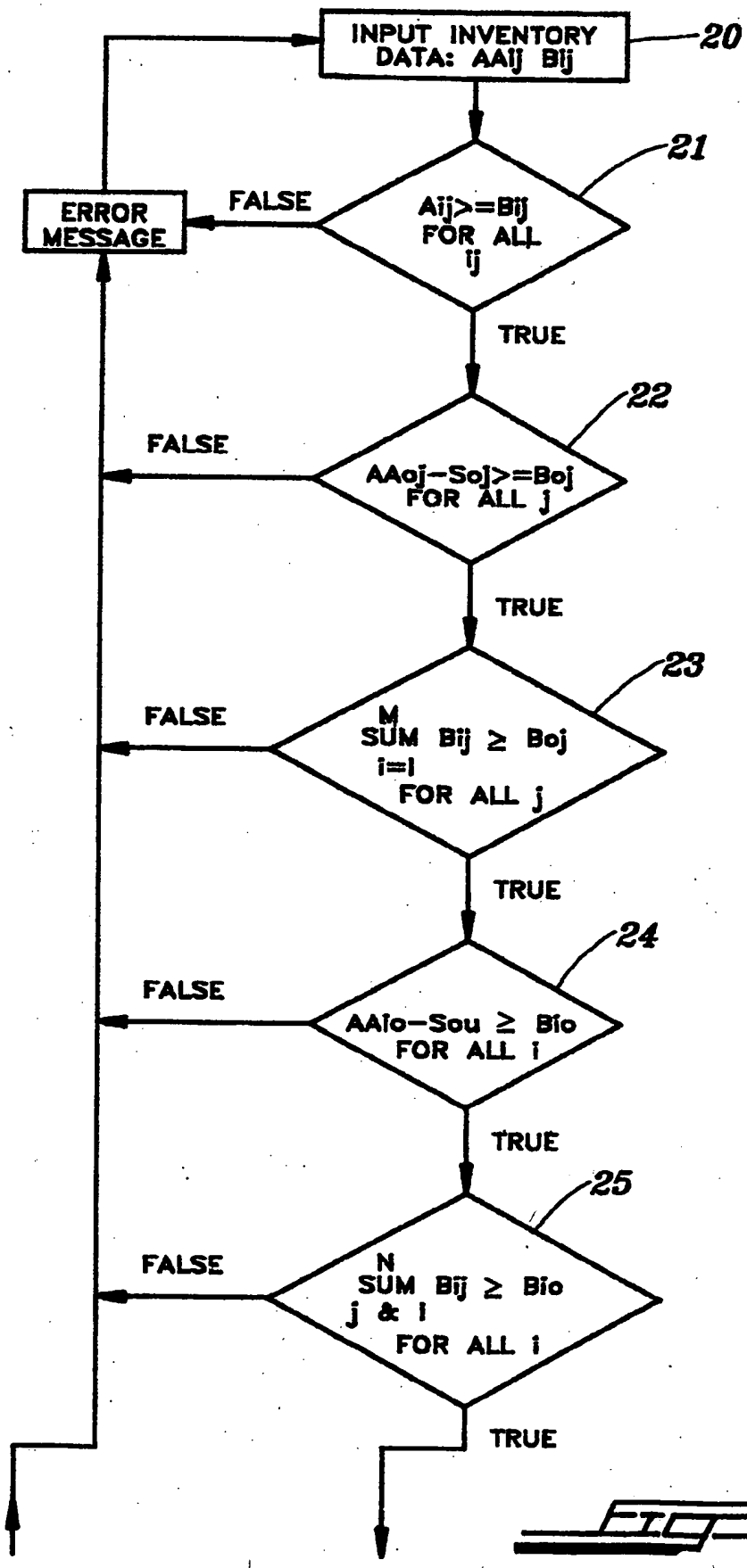
INPUT INVENTORY DATA: AAij Bij
20
Aij>=Bij FOR ALL ij
21
FALSE
ERROR MESSAGE
TRUE
AAoj−Soj>=Boj FOR ALL j
22
FALSE
TRUE
M SUM Bij ≥ Boj i=1 FOR ALL j
23
FALSE
TRUE
AAio−Sou ≥ Bio FOR ALL i
24
FALSE
TRUE
N SUM Bij ≥ Bio j & i FOR ALL i
25
FALSE
TRUE

FIG 1A

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Generate Collection

Search Results - Record(s) 1 through 10 of 10 returned.

1. Document ID: US 5640002 A Relevance Rank: 78

Entry 10 of 10 File: USPT Jun 17, 1997

US-PAT-NO: 5640002
DOCUMENT-IDENTIFIER: US 5640002 A
TITLE: Portable RF ID tag and barcode reader

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

2. Document ID: US 5721781 A Relevance Rank: 78

Entry 8 of 10 File: USPT Feb 24, 1998

US-PAT-NO: 5721781
DOCUMENT-IDENTIFIER: US 5721781 A
TITLE: Authentication system and method for smart card transactions

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

3. Document ID: US 5718754 A Relevance Rank: 75

Entry 9 of 10 File: USPT Feb 17, 1998

US-PAT-NO: 5718754
DOCUMENT-IDENTIFIER: US 5718754 A
TITLE: Pigment compositions

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

4. Document ID: US 5781723 A Relevance Rank: 65

Entry 6 of 10 File: USPT Jul 14, 1998

US-PAT-NO: 5781723
DOCUMENT-IDENTIFIER: US 5781723 A
TITLE: System and method for self-identifying a portable information device to a computing unit

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

constant K represents the free sale limit, or the maximum number of rooms that can be sold against an "open" indicator for each transaction.

The additional status indicator "Request" is used to indicate that inventory may be available, but a complete check is required before a sale can be made. For centralized systems, a complete check means applying all availability rules. For distributed inventory systems, a request must be made to the distributed system.

The flag process provides two key advantages. First, it reduces the overhead associated with checking availability, since availability is checked more often than changed. Second, it provides a consistent view of inventory in a distributed system by maintaining only one copy of the inventory data base. Also, the inventory data base may be kept centrally or may be distributed. In that way, availability can be checked anywhere, in any combination of systems while maintaining a consistent view of inventory to users at all locations.

Since the system of the invention is not affected by the location of the inventory data base, this system could be used for the four typical inventory distribution cases in any combination, as follows:

Centralized—all inventory is kept centrally for all properties, and all transactions are processed centrally.

Central control—inventory is kept centrally, but distributed locations such as properties can process transactions against availability flags.

Distributed—inventory is kept at distributed locations (e.g. properties or regional reservations centers) and availability flags or inventory allocations are maintained at a central location.

Mixed—combinations of all three above based on individual property or chain requirements.

The last mode of operation is the most promising for large hotel chains in the future, where imposing one of the other three modes of operation on all properties would be difficult, time-consuming or expensive. For multi-chain operators, using the best mode of reservations-operation for each chain will reduce operating cost and the development cost associated with "compromise" system solutions.

The system utilizes any conventional mainframe computer system with sufficient memory capacity for the central portion of the system. Minicomputers, microcomputers and personal computers may be utilized for the distributed portion of the system of the invention. Any conventional on-line system may be used for a centralized mode of operation. Other modes could use public or dial networks to implement the system.

A source listing of the computer program that may be stored in the computer memory of the system of the invention is given by way of example in the following Table I.

TABLE I.

```
Nov  9 17:22 1989  parin.per Page 1


DATABASE inv_sgl

SCREEN
{

HOTEL CODE    [f000 ]  [f001                                    ]

STARTING DATE [f002       ]       END DATE  [f003       ]

RATE CATEGORY [f004]   [f005                                    ]
}
END

TABLES
hotel
rate_lu
room

ATTRIBUTES
f000 = FORMONLY.propcd,UPSHIFT, REVERSE;
f001 = FORMONLY.htlnm, REVERSE, NOENTRY;
f002 = FORMONLY.stdt TYPE DATE, DEFAULT = TODAY, REVERSE;
f003 = FORMONLY.enddt TYPE DATE, REVERSE;
f004 = FORMONLY.ratecat, UPSHIFT, REVERSE;
f005 = FORMONLY.catdesc, NOENTRY, REVERSE;
END

INSTRUCTIONS
DELIMITERS "  "
END


database inv_sgl
screen
{

HOTEL CODE [f002 ] [f003                                    ]
```

☐ 5. Document ID: US 6010074 A Relevance Rank: 58

Entry 2 of 10 File: USPT Jan 4, 2000

US-PAT-NO: 6010074
DOCUMENT-IDENTIFIER: US 6010074 A
TITLE: Contactless proximity automated data collection system and method with collision resolution

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

☐ 6. Document ID: US 6024286 A Relevance Rank: 57

Entry 1 of 10 File: USPT Feb 15, 2000

US-PAT-NO: 6024286
DOCUMENT-IDENTIFIER: US 6024286 A
TITLE: Smart card providing a plurality of independently accessible accounts

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

☐ 7. Document ID: US 5901303 A Relevance Rank: 56

Entry 3 of 10 File: USPT May 4, 1999

US-PAT-NO: 5901303
DOCUMENT-IDENTIFIER: US 5901303 A
TITLE: Smart cards, systems using smart cards and methods of operating said cards in systems

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

☐ 8. Document ID: US 5875108 A Relevance Rank: 55

Entry 5 of 10 File: USPT Feb 23, 1999

US-PAT-NO: 5875108
DOCUMENT-IDENTIFIER: US 5875108 A
TITLE: Ergonomic man-machine interface incorporating adaptive pattern recognition based control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

☐ 9. Document ID: US 5901246 A Relevance Rank: 55

Entry 4 of 10 File: USPT May 4, 1999

US-PAT-NO: 5901246
DOCUMENT-IDENTIFIER: US 5901246 A
TITLE: Ergonomic man-machine interface incorporating adaptive pattern recognition based control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image

☐ 10. Document ID: US 5742718 A Relevance Rank: 55

For all i and j $A_{ij} > B_{ij}$

(FIG. 1, Block 21)

For all j $A_{0j} > B_{0j} = \text{SUM}_{i=1}^{M} B_{ij}$

(FIG. 1, Blocks 22, 23)

For all i $A_{i0} > B_{i0} \leq \text{SUM}_{j=1}^{N} B_{ij}$

(FIG. 1, Blocks 24, 25)

$$\text{SUM}_{j=1}^{N} B_{0j} = A_{00} > \text{SUM}_{i=1}^{M} B_{i0}$$

(FIG. 1, Block 26)

Referring to FIG. 2, in order to satisfy a request for "r" rooms for a span of dates, for room-type i and rate-category j, the following availability-relations must be true for each day (FIG. 2, Block 40, 42):

$A_{ij}>r$ inventory available for this rate/room-type

$A_{i0}>r$ inventory available for this rate-category

$A_{0j}>r$ inventory available for this room-type

$A_{00}>r$ total inventory available

Once the general availability of the required number of rooms has been established, additional rules must be applied to ensure that this sale will not violate a block. A block is not considered satisfied until the number of rooms sold is greater than or equal to the number blocked. The elements of the table RB indicate which blocks are still outstanding by calculating remaining blocked inventory as follows:

$$RB_{ij} = \text{MAX}(0, B_{ij} - S_{ij})$$

$$RB_{i0} = \text{MIN}\left(B_{i0}, \text{SUM}_{j=1}^{N} RB_{ij}\right)$$

$$RB_{0j} = \text{MIN}\left(B_{0j}, \text{SUM}_{i=1}^{M} RB_{ij}\right)$$

$$RB_{00} = \text{MIN}\left(B_{00}, \text{SUM}_{i=1}^{M} RB_{i0}, \text{SUM}_{j=1}^{N} RB_{0j}\right)$$

In practice, "overblocking" would not be allowed, so that last relation would be:

$$RB_{00} = \text{SUM}_{i=1}^{M} RB_{i0} = \text{SUM}_{j=1}^{N} RB_{0j}$$

In order to handle blocking in all cases, including overcommitting by rate-category (block B_{i0} rooms for rate-category, and also set B_{ij} to the same number for all room-types checked) the following rules must be applied:

If enough inventory is available for the day, then sell any rate-category; else only free to sell blocked rates.

If $A_{00}-RB_{00}>r$ Then free to sell any rate (FIG. 2, Block 44).

If enough inventory is available for the rate-category or room-type, then free to sell any room-type or rate-category respectively. Otherwise, only sell room-types or rates that have "remaining blocked" inventory (FIG. 2, Block 46).

If $A_{i0}-RB_{i0}>r$ (FIG. 2, Block 48), then free to sell any room-type for rate-category i; otherwise, can only sell blocked room-types in this rate-category (FIG. 2, Block 50).

Similarly, for room-type j.

If $A_{0j}-RB_{0j}>r$ (FIG. 2, Block 52), then free to sell any rate-category in room-type j; otherwise only sell rates with "remaining blocked" inventory (FIG. 2, Block 54).

A request for "r" rooms for a span of days must satisfy all of the following rules for each day:

General Availability Rules (FIG. 2, Block 42)		
1)	$A_{00} > r$	Inventory available for total hotel for this day
2)	$A_{i0} > r$	Inventory available for rate-category i for this day
3)	$A_{0j} > r$	Inventory available for room-type j for this day
4)	$A_{ij} > r$	Inventory available for the specific combination of rate-category i and room-type j for this day
Protected Inventory Rules (FIG. 2, Blocks 44-54)		
5)	$A_{00} - RB_{00} > r$	Unblocked inventory available for the day
	or $A_{00} - RB_{00} = r$	If not, then only blocked inventory can be sold, so blocked inventory must be available for the rate-category, room-type, and combination
	and $RB_{i0} > k$ and $RB_{0j} > k$ and $RB_{ij} > k$ where $k < r - (A_{00} - RB_{00})$	
6)	$A_{i0} - RB_{i0} < r$	Unblocked inventory is available for this rate category
	or $A_{i0} - RB_{i0} > r$	Only blocked inventory available for this rate category, so blocked inventory must be available for the rate/room-type combination
	and $RB_{ij} > r - (A_{i0} - RB_{i0})$	
7)	$A_{0j} - RB_{0j} > r$ or $A_{0j} - RB_{0j} > r$	Unblocked inventory for this room-type Only blocked inventory available for this room type, so blocked inventory and must be available for the combination
	and $RB_{ij} > r - (A_{0j} - RB_{0j})$	

Availability Flag Process

In most reservation systems, checking for availability of rates and room-types occurs much more often than the inventory sale or cancel process. Therefore, a table can be created that represents the availability status of all rates and room-types which results in a simplified availability checking process. This table can also be used to simplify inventory-handling and availability-checking for distributed inventory and manual systems, while maintaining the advantages of the reservation process of the invention.

The array F contains flags or semaphores that represent the current availability-status determined from the arrays A and RB. Each entry in F indicates "open" or "closed" based on the result of applying availability-rules to A and RB. Certain restrictions are applied when using F to determine current availability. The "open" status indicates that inventory is available for sale, but that "free sale" would be limited to "K" rooms. The

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DOCUMENT-IDENTIFIER: US 5742718 A
TITLE: Proprietary fiber connector and electronic security system

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categories defined, and each season may have different room-types. Six logical arrays are defined as follows:

AA is the maximum number of rooms authorized for sale

A is the number of rooms currently available for sale

S is the number of rooms sold

B is the number of rooms blocked or protected

RB is the number of rooms remaining in a block (still protected)

F is a table of availability flags showing "Open," "Request," or "Closed"

AA and B are set by the reservations-manager (FIG. 1, Block 20). S is updated as rooms are sold or cancelled. A is calculated from number of rooms authorized and number sold. In addition to setting the maximums available for sale in AA, the reservations-manager can protect inventory by specifying a minimum available for a room-type/rate-category combination. The array B contains these minimums. The array RB is calculated from arrays B and S, and indicates the number of rooms remaining to be sold to satisfy blocks. The array F is set automatically based on arrays A and RB.

An arbitrary number of rows may be defined in the arrays for each inventory-date, based on the number of rate-categories available. A rate-category may be a special rate available for a specific group or type of guest (qualified rate) or may be one of many rates generally available (unqualified rate).

Most hotels would have the same room-types year-round, and hence would have the same number of columns. In some cases, a hotel might have seasonal or other reasons to change the number of room-types defined. Recognition of a consistent number of room-types and a variable number of rate-categories is a key element of the system of the invention. This observation is also the key to utilizing relational database methods to manage inventory.

The second key element of the system of the invention is that it allows the reservations-manager to place maximums (limits) and minimums (blocks) on total rooms, rate-categories, room-types, and/or specific combinations of rate and room-type. The user may limit the total number of rooms available for all room-types in a rate-category to be less than the sum of rooms specified as available for all room-types in that rate-category. The user may also limit the number of rooms available for a room-type to be less than the sum of the rooms available for that room-type in all rate-categories. This flexibility allows a reservations-manager to specify maximums available for each rate/room-type combination, and maximums for each rate and room-type, and allow the system to prevent overselling.

The system also allows the reservation-manager to block inventory for specific rate-categories (such as groups or special packages) and specify which room-types may be sold to satisfy the block. Finally, the invention allows the user to set an overall limit on the number of rooms available for each day, which may override the total number of rooms available for all room-types in all rate-categories.

The reservations-manager can specify four levels of limitations or maximums:

AA_{ij} is the maximum that can be sold for a specific rate

AA_{i0} is the maximum that can be sold for rate category i

AA_{0j} is the maximum that can be sold for a room-type j

AA_{00} is the maximum that can be sold for that day

The availability matrix array A is calculated from the matrix arrays AA and S, and represents the number of rooms left to sell. According to the invention, the sum of all room-types available for sale in a given rate-category (matrix row-sum) may exceed the maximum allowed for the rate-category. The practical explanation is that many room-types may be sold in the same rate-categories to satisfy customer preference. The advantage of the invention is that the reservations-manager does not need to make a specific, rigid allocation of rooms by physical room-type to a rate-category.

In practice, a warning message would be issued if the reservation manager has not specified enough rooms available for a room-type, a rate-category, or for the day, as follows, it being understood that the term SUM in the following refers to the iterative process associated with matrix analysis:

$$\text{If } \mathrm{SUM}_{i<1}^{M} AA_{ij} < AA_{0j}$$

not enough inventory allocated to rate categories 1 to M for room-type j

$$\text{If } \mathrm{SUM}_{j<1}^{N} AA_{ij} = AA_{i0}$$

not enough inventory allocated to room types 1 to N for rate-category i

$$\text{If } \mathrm{SUM}_{i<1}^{M} AA_{i0} = AA_{00}$$

not enough inventory allocated to all rate-categories for this day

$$\text{If } \mathrm{SUM}_{j<1}^{M} AA_{0j} = AA_{00}$$

not enough inventory allocated to all room-types for this day

In general, the reservations-manager would maintain a balanced or slightly oversold condition, so that the following relations would hold:

$$\text{for all } j \quad \mathrm{SUM}_{i\neq 1}^{M} AA_{ij} > AA_{0j}$$

(FIG. 1, Block 29)

$$\text{for all } i \quad \mathrm{SUM}_{j\neq 1}^{N} AA_{ij} \quad AA_{i0}$$

(FIG. 1, Block 28)

If these above-logical relations do not hold, then an error messages will be generated (FIG. 1, Blocks 30, 32).

The system also guards against blocking more inventory than is available. For instance, if a reservations-manager tried to block more inventory in individual rate-categories than was available for a room-type, an error message would be generated (FIG. 1, Block 28). The system forces the following relations to hold: